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## Two Species of Digenetic Trematodes from Marine Fishes of the Tsushima Islands, with Reference to Parantorchiinae

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A survey has been made on the parasites of marine fishes of the Tsushima Islands lying in the straits between the Korean Peninsula and Kyushu, the westernmost main island of Japan, intermittently since 1968. Fishes for study were collected by commercial stationary net. Trematodes were fixed in acetic sublimate under slight cover glass pressure, stained with Heidenhain's hematoxylin and mounted in balsam. The present report deals with two species of digenetic trematodes; the one is a fellodistomid species, *Antorchis tsushimaensis* n. comb. from *Chaetodontoplus septentrionalis*; the other is a lepocreadiid species, *Eviototrema tsushimaense* n. g., n. sp. from *Eviotias acutirostris*, and *Eviototrematinae* n. subf. is erected for it. In addition, a reference is made that both *Parantorchis* and *Neoparantorchis* are synonymous with *Antorchis*, so that Parantorchiinae is withdrawn in favour of Antorchiinae. The specimens are deposited in the collection of the National Science Museum, Tokyo.

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### Fellodistomidae

*Antorchis tsushimaensis* (MACHIDA, 1971), n. comb.

Syn. *Parantorchis tsushimaensis* MACHIDA, 1971

(Figs. 1-2)

This species was described under the name of *Parantorchis tsushimaensis* based on the materials from *Chaetodontoplus septentrionalis* (TEMMINCK et SCHLEGEL) in 1971. Later, many individuals of this trematode were collected from the small intestine of the same host. Re-examination of the specimens (NSMT-PI-1619) came to the conclusion that this species should be transferred to *Antorchis* for the following reasons: 1) The excretory vesicle is not I-shaped, but V- or Y-shaped, and the arms extend to the posterior end of the testes. 2) YAMAGUTI (1971) found the dorsal pouch in the

midregion of the hindbody not only in the type-species of the genus, *Antorchis urna* (LINTON, 1910), but also in *A. holacanthi* SIDDIQI et CABLE, 1960. This pouch is also observed in the present species in the midline posterior to the acetabulum. 3) The ovary is usually situated antero-dorsal to the acetabulum, but when the worm is pressed, it sometimes shifts the position to lateral or at some distance anterior to the acetabulum. For the same reason, the cirrus pouch sometimes turns sideways or upside down. 4) Laurer's canal is very long and opens mid-dorsally near the posterior extremity of the body.

### Discussion on Parantorchiinae

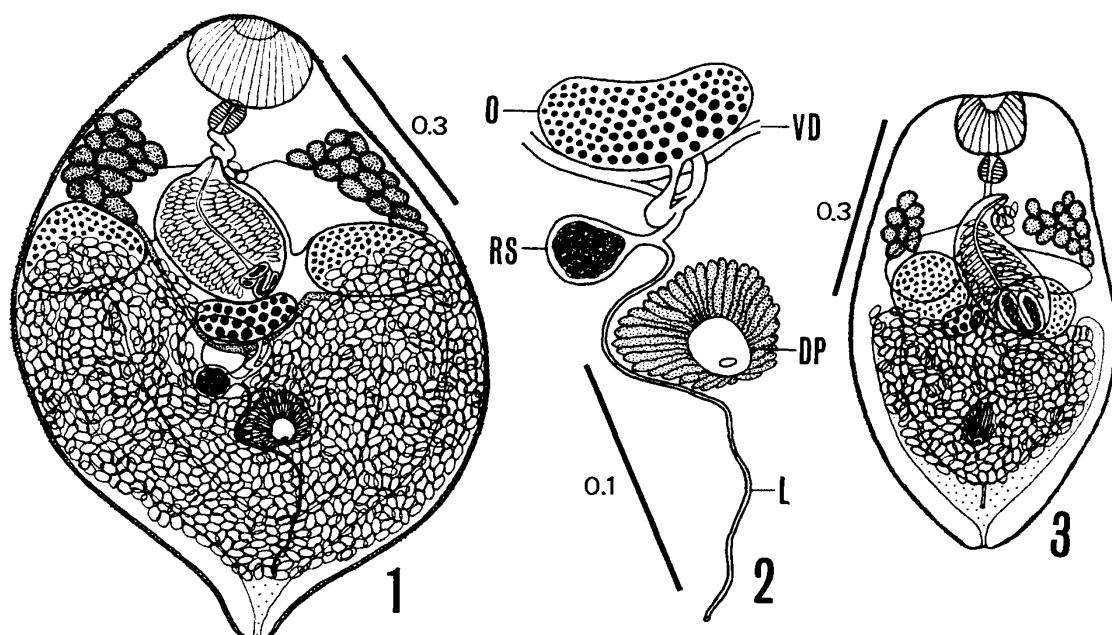
YAMAGUTI (1934) created the genus *Parantorchis* for the species *P. chaetodontis* and placed it in his new subfamily Parantorchiinae. HAFEEZULLAH and SIDDIQI (1970) added the second genus *Jonesiella* to Parantorchiinae but later this genus was renamed *Neoparantorchis* by the same authors due to the former being preoccupied.

In his description, YAMAGUTI (1934) mentioned that "several specimens of this trematode were found in the lower part of the intestine of *Chaetodon* sp. from the west coast of Kyushu." However, the measurements on the worms in the description were based on two specimens among several (accurately five) specimens. According to him, *P. chaetodontis* seems to be characteristic in that: 1) The caeca are long and narrow, extending beyond the equator of the body. 2) The oral sucker is smaller than the acetabulum. 3) The seminal vesicle is oval. 4) The ovary and the seminal receptacle are situated in the forebody. 5) Laurer's canal opens dorsally at the level of the posterior border of the seminal receptacle. 6) The excretory vesicle takes an I-shape.

A re-examination of the two specimens, holotype and paratype (MPM Coll. No. 22343), has revealed that the Laurer's canal is not traceable at all and that the excretory vesicle bears such a short stem as to be indistinguishable whether it is I-shaped as described by YAMAGUTI (1934) or Y-shaped like those of *Antorchis*, because the specimens are pressed strongly and bad in staining. The remaining three paratype specimens (MPM Coll. No. 22343) were obtained from the central part of the intestine of the same individual of the host and were labeled as *P. chaetodontis* n. sp., but excluded from the measurements for unknown reason. The reason might be that they are all smaller sized and have a smaller number of eggs than the preceding two specimens. Besides, they are bad in staining and one of them is broken.

Measurements of the three paratypes made by the present author are supplemented to the original specific diagnosis of YAMAGUTI (1934, p. 415) as follows: Body 0.73–1.67 mm long. Oral sucker  $0.10\text{--}0.21 \times 0.10\text{--}0.22$  mm. Pharynx  $0.039\text{--}0.095 \times 0.052\text{--}0.1$  mm. Acetabulum  $0.12\text{--}0.34 \times 0.12\text{--}0.44$  mm. Testes  $0.12\text{--}0.24 \times 0.12\text{--}0.2$  mm. Ovary 0.07–0.17 mm in major axis. Eggs  $0.029\text{--}0.035 \times 0.015\text{--}0.018$  mm.

Careful examination of these specimens shows the following variation and/or new findings (Fig. 3): 1) The caeca are short and wide, terminating at the equator of



Figs. 1-2. *Antorchis tsushimaensis* (MACHIDA, 1971), n. comb. —— 1. Entire worm (NSMT-Pl-1619), dorsal view. —— 2. Ovarian complex, dorsal view. DP, dorsal pouch; L, Laurer's canal; O, ovary; RS, receptaculum seminis; VD, vitelline duct. Scales in mm.  
Fig. 3. *Antorchis chaetodontis* (YAMAGUTI, 1934), n. comb. Orig., entire worm of paratype (MPM Coll. No. 22343), dorsal view. Scale in mm.

the body. They are different in length between large- and small-sized worms. The difference may be concerned with the caecal width. 2) The seminal vesicle is U-shaped. 3) The ovary lays aside or obliquely anterior to the acetabulum. 4) Laurer's canal opens mid-dorsally near the posterior extremity of the body. 5) The dorsal pouch is found at the midline posterior to the acetabulum. 6) The excretory vesicle takes a Y-shape and the arms extend to the posterior end of the testes.

Taking these new findings on the paratypes into consideration, the genus *Parantorchis* is obviously synonymous with *Antorchis*. Therefore, *P. chaetodontis* is transferred to *Antorchis* and becomes *A. chaetodontis* (YAMAGUTI, 1934), n. comb.

In *Antorchis*, relative position of the ovary to the acetabulum seems to be variable. The ovary lays very close, such as just anterior, just lateral or just posterior, to the acetabulum, or at some distance anterior to the acetabulum as in the present author's observation on *A. tsushimaensis*. MANTER (1947, p. 320) also stated that the ovary may be anterior to the acetabulum in *A. urna*.

The second genus *Neoparantorchis* is characterized by HAFEEZULLAH and SIDDIQI (1970) in having a posttesticular ovary, bipartite seminal vesicle, posteriorly displaced acetabulum, and short, saccular, club-shaped caeca. These features agree in all respects with those of *Antorchis* excepting the presence or absence of the dorsal pouch being unsolved, and the excretory vesicle of *N. pomacanthi* (HAFEEZULLAH et SIDDIQI, 1970) is Y-shaped like those of *Antorchis*; thus *Neoparantorchis* is also to be synony-

mous with *Antorchis*.

Therefore, Parantorchiiinae is withdrawn here in favour of Antorchiiinae.

Consequently, *Antorchis* contains six species: *A. urna* (LINTON, 1910), *A. lintoni* TRAVASSOS, ARTIGAS et PEREIRA, 1928, *A. chaetodontis* (YAMAGUTI, 1934), n. comb., *A. holacanthi* SIDDIQI et CABLE, 1960, *A. pomacanthe* (HAFEEZULLAH et SIDDIQI, 1970), n. comb., and *A. tsushimaensis* (MACHIDA, 1971), n. comb. Of these, *lintoni* is defective in description such as no reference to the cirrus pouch and *holacanthi* is considered by OVERSTREET (1969) to be a synonym of *urna* because of the overlap in characteristics.

The Japanese and Indian species, *chaetodontis*, *tsushimaensis* and *pomacanthe*, are belonging in general to the group in which the ovary lies rather anteriorly than those of Caribbean and/or Atlantic species, *urna*, *lintoni* and *holacanthi*. Two Japanese species, *chaetodontis* and *tsushimaensis*, differ from *urna* and *holacanthi* in the cirrus without spines, and also differ from *pomacanthe* in smaller egg size. The two Japanese species closely resemble each other, but differences are observed in the sucker ratio and the shape of the seminal vesicle, that is, the oral sucker is smaller than the acetabulum and the seminal vesicle is oval or U-shaped in *chaetodontis*, whereas the oral sucker is larger than the acetabulum and seminal vesicle is convoluted tubular in *tsushimaensis*. However, they are very nearly related to each other so far as the host and the locality are concerned, namely, *chaetodontis* was found in *Chaetodon* sp. from the west coast of Kyushu, while *tsushimaensis* was obtained from *Chaetodontoplus septentrionalis* from the Tsushima Islands northwest of Kyushu. From these point, *tsushimaensis* may be placed in synonymy with *chaetodontis* on further examination.

### Lepocreadiidae

#### *Evistiotrema tsushimaense* n. g., n. sp.

(Figs. 4-5)

*Host.* *Evistias acutirostris* (TEMMINCK et SCHLEGEL).

*Habitat.* Small intestine.

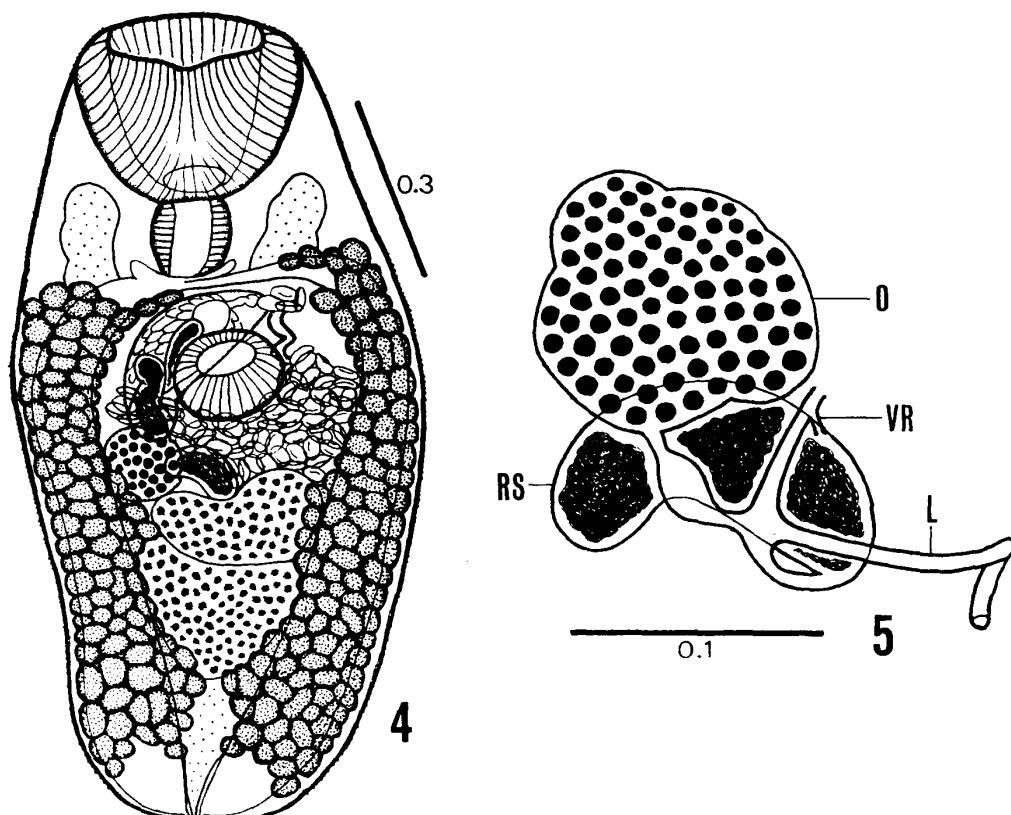
*Locality.* Tsushima Islands, in the Sea of Japan.

*Date collected.* 3-V-1974.

*Specimen No.* NSMT-Pl-1636.

*Description.* Body club-shaped, 1.30-1.68 mm long and 0.56-0.81 mm wide.

Cuticle spinose. Eye spots absent. Oral sucker subterminal, large, cup-shaped, 0.280-0.357×0.316-0.388 mm; prepharynx very short, up to 0.05 mm long; pharynx nearly globular, well-developed, 0.122-0.163×0.117-0.158 mm; esophagus curved, about 0.25 mm long, bifurcating at anterior third of body; caeca voluminous, descending along both sides of body and opening outside separately by tiny ani close to excretory pore at posterior extremity of body. Acetabulum round, smaller than oral sucker, 0.148-0.224×0.173-0.245 mm, equatorial or somewhat pre-equatorial. Sucker ratio 1: 0.49-0.65. Testes irregularly oval, tandem, adjoining each other in central area



Figs. 4-5. *Evistiotrema tsushimaense* n. g., n. sp. —— 4. Entire worm (NSMT-Pl-1636), ventral view. —— 5. Ovarian complex, ventral view. L, Laurer's canal; O, ovary; RS, receptaculum seminis; VR, vitelline reservoir (omitted). Scales in mm.

of hindbody; anterior testis  $0.128-0.204 \times 0.240-0.306$  mm, posterior testis  $0.168-0.265 \times 0.194-0.306$  mm. Cirrus pouch large, fusiform,  $0.35-0.48 \times 0.107-0.168$  mm, right to acetabulum or overlapped it in part, containing convoluted tubular vesicula seminalis, globular pars prostatica with prostatic cells, and sinuous ductus ejaculatorius. Ovary subglobular with indented surface,  $0.102-0.199 \times 0.082-0.143$  mm, dextro-equator of body. Oviduct arising from posterior part of ovary, connected with the duct of receptaculum seminis, giving off Laurer's canal, and then receiving vitelline reservoir. Receptaculum seminis arched saccular,  $0.128-0.214 \times 0.041-0.071$  mm, dorsosinistral to ovary and overlapped it in part. Laurer's canal opening dorsad in midline of anterior margin of anterior testis. Vitelline follicles surrounding caeca except for posterior ends. Vitelline reservoir triangular, ventral to receptaculum seminis. Uterus in postero-lateral region of acetabulum, and metraterm running meanderingly antero-sinistral to acetabulum. Genital pore a little to left of midline near caecal bifurcation. Uterine eggs elliptical, thin-shelled, embryonated,  $0.044-0.052 \times 0.026-0.031$  mm. Excretory vesicle Y-shaped, bifurcating at posterior region of acetabulum, and arms extending to level of pharynx or sometimes a little more anteriorly; pore terminal.

*Discussion.* The present genus is characterized by the following respects: 1) Body has spinous cuticle. 2) The caeca open separately by two ani at the posterior extremity of the body. 3) The cirrus pouch is well-developed. 4) The external seminal vesicle is lacking. 5) The seminal receptacle exists. 6) The excretory vesicle takes a Y-shape. According to YAMAGUTI (1971), the family Lepocreadiidae contains 24 subfamilies, three of which, Allolepidapedinae, Diploproctodaeinae and Sphincterostomatinae, are the groups that have two ani. But the present genus differs from those of Allolepidapedinae in having no external seminal vesicle, genital pore opening in submedian line; it differs from those of Diploproctodaeinae in having normal-shaped forebody, no external seminal vesicle; and it also differs from those of Sphincterostomatinae in having no sphincter on the oral sucker, in having cirrus pouch, though showing superficial resemblance to those genera. On the other hand, six subfamilies, Allolepidapedinae, Dermadeninae, Folliorchiiinae, Petalocotylinae, Phyllotrematinae and Trigonotrematinae, are the groups having Y-shaped excretory vesicle. Of these, differences between the present genus and those of Allolepidapedinae are as mentioned above. The present genus differs from those of Dermadeninae in having no dermal glands, no external seminal vesicle; it differs from those of Folliorchiiinae in the testes not divided into a number of follicles, no external seminal vesicle; it differs from those of Petalocotylinae in having no seminal vesicle free in parenchyma; it differs from those of Phyllotrematinae in the testes not symmetrical, uterus not extending posterior to the testes; and it also differs from those of Trigonotrematinae in having normal-shaped hindbody, no external seminal vesicle. Furthermore, the groups that have Y-shaped excretory vesicle are without two ani except for *Neoallolepidapedon* of Allolepidapedinae. Therefore, Evistiotrematinae n. subf. is erected for the present new genus.

#### **Evistiotrematinae n. subf.**

Lepocreadiidae. Body spinose; eye spots absent. Oral sucker large, cup-shaped, subterminal; pharynx well-developed; caeca opening outside separately by ani. Acetabulum near equatorial. Testes tandem in hindbody. Cirrus pouch fusiform, containing tubular vesicula seminalis, globular pars prostatica with prostatic cells and sinuous ductus ejaculatorius. Vesicula seminalis externa absent. Ovary pretesticular, dextro-equatorial. Receptaculum seminis and Laurer's canal present. Vitellaria follicular, extending around caeca except for posterior ends. Uterus in postero-lateral region of acetabulum. Excretory vesicle Y-shaped, arms reaching level of pharynx. Intestinal parasites of marine teleosts.

Type-genus: *Evistiotrema* n. g.

#### ***Evistiotrema* n. g.**

Lepocreadiidae, Evistiotrematinae. Body club-shaped, with spinous cuticle. No eye spots. Oral sucker large, cup-shaped, subterminal; prepharynx very short;

pharynx globular, well-developed; esophagus short; caeca voluminous, opening outside separately by ani. Acetabulum smaller than oral sucker, at middle of body. Testes subglobular, tandem in hindbody. Cirrus pouch fusiform in acetabular region, containing convoluted tubular vesicula seminalis, globular pars prostatica with prostatic cells and sinuous ductus ejaculatorius. Vesicula seminalis externa absent. Genital pore a little to left of midline near caecal bifurcation. Ovary subglobular, pretesticular, dextro-equatorial. Receptaculum seminis dorso-sinistral to ovary. Laurer's canal present. Vitellaria follicular, distributed around caeca except for posterior ends. Uterus in postero-lateral region of acetabulum, metraterm antero-sinistral to acetabulum. Excretory vesicle Y-shaped, arms extending to level of pharynx, pore terminal. Parasitic in intestine of marine teleosts.

Type-species: *Evistiotrema tsushimaense* n. g., n. sp.

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